

REMARKS

Claims 1-30 are pending in the application. Claims 12, 13, 15-17, 19, 20 and 22 are rejected. Claims 14, 18 and 21 are objected to. Claims 1-11 and 23-30 are withdrawn. Claims 14, 18, and 21 are rewritten in independent form. Claims 12, 16 and 20 are herein amended. No new matter has been entered.

Claim Rejections - 35 U.S.C. §103

Claims 12, 13, 15-17, 19, 20 and 22 are rejected under 35 U.S.C. §103(a) as being unpatentable over Matsuura (U.S. Patent No. 6,737,746) in view of Loboda et al. (U.S. Patent No. 6,593,655).

The Examiner admits that Matsuura teaches a first SiOC, but fails to teach the first SiOC containing hydrogen and having a carbon content of at least about 18 at%. The Examiner concludes that it would have been obvious to incorporate the first SiOC containing hydrogen and having a carbon content of at least about 18 at% as taught by Loboda et al. so that the desired dielectric constant and mechanical/electrical properties can be achieved in Matsuura's device.

Applicants herein clarify the independent claims 12, 16 and 20, and subsequently disagree with the rejection because not all of the claimed limitations are taught by the cited combination of references.

Applicants note that the cited references recite wide ranges of specific dielectric constant, carbon content, and hydrogen content, but fail to disclose the particularly limited claimed range appropriate for the semiconductor device.

The particularly narrow claimed range of the present invention improves adhesion and increases the physical strength such as hardness and Young's modulus in comparison with conventional silicon oxycarbide known as CORAL (Novellus Systems, Inc.)(page 8, last paragraph). The specific dielectric constant of CORAL is 2.9 (page 8, line 17). On the other hand, the silicon oxycarbide of the present invention (TORAL) is at least 3.0 (see Fig. 1c).

Although the specific dielectric constant becomes larger by some amount, the present invention shows unexpectedly improved adhesion (page 13, third paragraph) and higher hardness and elastic constant (Young's modulus) than the prior art. For satisfying these adhesion strength and physical strength, the specific dielectric constant is at least 3.0. Therefore, Applicants clarified the independent claims to recite the specific dielectric constant in a range of at least 3.0 to at most 3.1, which results in the unexpectedly superior qualities compared to the prior art. Because CORAL is a trademark, Applicants do not refer to it in the claims. Instead, Applicants use as a generic definition of CORAL as carbon oxycarbide having compositions of H 32.0 wt%, C 16.1 wt%, O 33.7 wt%, and Si 18.2 wt% (see Fig. 2A) and having specific dielectric constant of 2.9 (page 8, line 17).

Applicants note that the cited references teach silicon oxycarbide of dielectric constants of very wide range, but to not teach or suggest the unexpected advantages of compositions appropriate to enhance adhesion and physical strength. For example, specific dielectric constant of 1.8 to 3.0 is taught, but the range of 3.0 to 3.1 is not taught. The Applicants' invention provides low-k insulating film with improved adhesion and physical strength by selecting the composition and specific dielectric constant.

Therefore, because the unexpectedly superior properties are shown with the narrowly claimed range of dielectric constant, Applicants submit that the present invention is neither taught nor suggested by the cited combination of references.

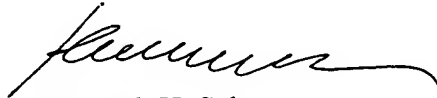
In view of the aforementioned amendments and accompanying remarks, Applicants submit that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

To the extent necessary, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension of time or any other fees that may be due with respect to the filing of this paper may be charged to the deposit account of Westerman, Hattori, Daniels & Adrian, LLP, Deposit Account No. 50-2866 (Atty. Docket No. 032060). Similarly, any excess fees may be credited to the above deposit account.

Respectfully submitted,

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